## REMARKS

Claim 42 has been amended to correct a minor typographical error. New claims 51-61 have been added. Accordingly, claims 29, 31-45, and 47-61 are currently pending in this application. The status of the application in light of the Office Action mailed January 17, 2007, is as follows:

(A) Claims 29, 31-39, 41-45, 47, 49, and 50 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 3,848,389 ("Gapp") in view of U.S. Patent No. 6,375,120 ("Wolnek").

(D) Claims 40 and 48 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Gapp in view of Wolnek as applied to claims 29 and 47, and further in view of U.S. Patent No. 4,556,591 ("Bannink").

As a preliminary matter the undersigned wishes to thank Patent Examiner Ferguson for participating in an Examiner Interview on April 11, 2007. During the interview, the Gapp and Wolnek references were discussed. Although no agreement was reached, the Examiner indicated that the language in new claim 51 may be patentable over the cited references pending an additional search and further consideration. This paper constitutes the applicant's summary of this interview. If the Examiner notes any deficiencies with regard to this summary, the Examiner is encouraged to contact the undersigned attorney.

C. Response to Section 103 Rejections Based on Gapp in View of Wolnek

Claim 29 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Gapp in view of Wolnek. As described below, the rejection of claim 29 should be withdrawn because Gapp and Wolnek do not disclose or suggest all of the features of this claim.

(1) Claim 29 is directed to a system that, *inter alia*, includes a composite material joined to a metallic material.

Claim 29 is directed toward a system of joined structures that includes a first structure having a first aperture in a composite material. The first aperture has a first interior surface and a first minimum radial extent. The composite material is configured so that a small radial force applied to the first internal surface will damage the composite material. The system further includes a second structure that has a second aperture in a metallic material. The second aperture has a second interior surface and a second minimum radial extent at least approximately the same as the first minimum radial extent. The system still further includes a coupling device that has a first shank section extending through the first aperture and a second shank section extending through the second aperture but not extending into the first aperture. The first shank section of the coupling device has at least one of a hardness, toughness, and density greater than that of the second shank section of the coupling device, wherein (1) a portion of the second shank section has a greater radial extent than the first shank section, (2) the portion of the second shank section applies a first radial force to the second interior surface and the first shank section applies at least approximately no radial force to the first interior surface, and (3) the composite material proximate to the first aperture is undamaged.

(2) Gapp discloses a bimetal rivet with expansion characteristics that insures a hole in a first plate and a hole in a second plate are both filled when the bimetal rivet is upset.

Gapp discloses a bimetal rivet that has a head or shank configured of a high strength metal, and a tail or head forming end made of a ductile metallic material (col. 1, lines 28-32). The geometry at the point where the two different materials are joined facilitates the formation of the rivet head (col. 1, lines 51-57). The bimetallic rivet in Gapp allows two plates to be joined together so that a hole in the first plate and a hole in the second plate are both filled, providing a satisfactory rivet bearing configuration (col. 2, lines 27-41; col. 3, line 43-col. 4, line 15).

More particularly, the Gapp reference recites the following:

The use of special alloys and metals for rivets has been increasing over recent years. . . A material which offers the satisfactory strength properties is usually difficult to rivet by conventional methods. They do not have sufficient ductility and are not readily formable into a rivet head. This often results in the formation of an unsatisfactory rivet or the actual splitting of the head during riveting. (col. 1, lines 5-23)

It is therefore an object of our invention [the Gapp invention] to provide a rivet of a high strength alloy such as those of titanium on which it would be possible to form a satisfactory rivet head. (col. 1, lines 24-27) . . .

We have discovered further that by using various unusual geometries at the point where the two different materials are joined, we are able not only to obtain a satisfactory integral joint, using established joining processes, but also facilitate the formation of the rivet head. This will all be evident from the description and drawings which follow. (col. 1, lines 51-57)

Referring now more particularly to FIG. 1 and FIG. 2, there are seen plates 1 and 2 in the process of being joined together by rivets 3. A flat or countersunk head rivet is shown in FIG. 1, while a button head rivet is shown in FIG. 2. Our invention may be adapted to any style of rivet head, as will become evident from what follows. The body or shank of the rivet 4 is joined to the tail section 5 at interface 6. It is evident that in each Figure, one rivet is shown before driving and one after driving. The location of the interface 6 is shown before driving and 6a after driving. After driving, the driven head appears at 7, the lower portion of the rivet at 8, and the upper portion at 9. (col. 2, lines 5-20)

In previous constructions attempts have been made to heat treat the tail section 5 of the rivet, which, of course, was composed of a single metal, in order to render it more ductile and formable. This, however, resulted in a gradual change in properties of the rivet shank and not a sudden change as in the present invention. Consequently, when the rivet was driven, the upsetting action of the shank was not uniform and the rivet did not completely fill the rivet hole at the upper section 9 as shown on FIG. 1. To develop its proper maximum strength, the rivet shank or body should completely fill the rivet hole as shown at 9 in FIG. 2, as is well known to those skilled in the art. (col. 2, lines 21-33)

Attempts have been made to overcome this by using a washer between plate 2 and head 7 to facilitate formation of the head in a difficult to deform rivet shank. **Use of the rivets of the present invention, of course, eliminates**

> **the need for a washer, enables us to provide a satisfactory head 7, as well as a satisfactory rivet bearing in the rivet hole, as shown at 8 and 9 in FIG. 2.** (col. 2, lines 34-41) . . .
>
> With [the] configuration [shown in Figure 3] we have discovered that a good head 7 may be formed while also providing for improved expansion of the shank 4 into the holes in plates 1 and 2 as shown. (col. 3, lines 53-56) . . .
>
> In the configuration of FIG. 4 . . . [t]he shank section protrudes a considerable distance beyond the outer surface of plate 2 and hence the riveting action produces a greater upsetting effect upon shank section 4 insuring more complete filling of the holes in plates 1 and 2 by the rivet shank. (col. 4, line 57-col. 4, line2) . . .
>
> In . . . FIG. 5, . . . there is seen an expansion of the shank section 4 to completely fill the holes in plates 1 and 2 and also an upset of the shank section 4 outside the plate. (col. 4, lines 3-15) [Emphasis Added]

In the above referenced Office Action, the Examiner argues that Figure 1 of Gapp is a first embodiment of the invention and that each disclosed embodiment provides a high strength and satisfactory rivet with distinct advantages, referencing col.1, lines 43-62, col. 2, lines 8-20, and col. 4, lines 16-24. The applicant respectfully disagrees. Gapp never claims that Figure 1 is an embodiment of the invention and never suggests that there are any advantages associated with Figure 1. Figures 1 and 2 are used to show the difference between a rivet that does not have proper maximum strength (Figure 1) and a rivet joint with proper maximum strength (Figure 2). After Gapp uses Figures 1 and 2 to illustrate the deficiencies with the rivet joint shown in Figure 1, Gapp goes on to state that the "actual configuration of the interface between the two different metals [of the bimetal rivet] forms an important feature of [the] invention. . . . [and that] [v]arious configurations which . . . have shown to be particularly advantageous are shown on FIG. 3, FIG 4 and FIG. 5" (col. 3, lines 24-32). Furthermore, the portion of Gapp discussing the advantages of various configurations referenced by the Examiner in col. 4, lines 16-24, only discuss advantages relative to the three configurations shown in Figures 3-5.

Additionally, Gapp specifically says that unlike the rivet in Figure 1 which does not provide satisfactory "rivet bearing in the rivet hole," rivets of the Gapp invention provide

satisfactory "rivet bearing in the rivet hole." Specifically, Gapp states that in Figure 1 "the upsetting action of the shank was not uniform and the rivet did not completely fill the rivet hole at the upper section 9 (col. 2, lines 21-33). Gapp goes on to say that "[t]o develop its proper maximum strength, the rivet shank or body should completely fill the rivet hole as shown at 9 in FIG. 2 (col. 2, lines 21-33). Gapp then states that "Use of the rivets of the [Gapp] invention . . . enables [them] to provide a satisfactory head 7, as well as a satisfactory rivet bearing in the rivet hole, as shown at 8 and 9 in FIG. 2." (col. 2, lines 34-41). This clearly indicates that unlike rivets of the Gapp invention, the rivet shown in Figure 1 of Gapp does not provide a satisfactory rivet bearing joint. Accordingly, Gapp teaches away from using the rivet configuration shown in Figure 1 of Gapp.

(3) Wolnek discloses a metallic inlay embedded in a composite material and used to distribute the load from a fastener coupled to the inlay.

Wolnek discloses embedding a high load bearing strength metallic inlay in a composite material to distribute a structural load from a fastener coupling the metallic inlay to a metallic structure over a wide enough area to reduce or eliminate damage to the composite material (col. 1, line 65-col. 2 line 5; col. 4, lines 1-12). In Wolnek, the metallic inlay is embedded into the composite using a resin (col. 5, lines 37-61). A fastener is used to fasten the inlay to a metallic structure (col. 1, line 65-col. 2, line 5; Figure 4; col. 3, line 66-col. 4, line 27). The inlay distributes applied loads over a wide enough area to reduce or eliminate damage to the composite material from structural loads (col. 1, line 65-col. 2 line 5; col. 3, line 66-col. 4, line 27). All of the illustrated embodiments in Wolnek show a rivet that is fully expanded in the metallic inlay and in the metallic structure (Figures 4-6).

(4) Gapp and Wolnek do not teach or suggest all the features of claim 29.

Gapp and Wolnek fail to teach or suggest, *inter alia*, a coupling device that has a first shank section extending through a first aperture in a composite material and a second shank section extending through a second aperture in a metallic material, where the first

shank section of the coupling device has at least one of a hardness, toughness, and density greater than that of the second shank section of the coupling device, and wherein (1) a portion of the second shank section has a greater radial extent than the first shank section, (2) the portion of the second shank section applies a first radial force to the second interior surface and the first shank section applies at least approximately no radial force to the first interior surface, and (3) the composite material proximate to the first aperture is undamaged. Gapp specifically teaches that the Gapp rivets join two plates together with a rivet that has a satisfactory head, as well as a satisfactory rivet bearing in the rivet hole, as shown in FIG. 2 of Gapp, where the holes in both of the plates are filled by the rivet. Gapp goes onto explain that previous attempts have been made to heat treat the tail section of a rivet in order to render it more ductile and formable to facilitate head formation during the upsetting process. However, Gapp states that these previous attempts have resulted in the unsatisfactorily driven rivet, as shown in Figure 1 where the rivet does not completely fill the holes in both plates. Accordingly, Gapp specifically teaches away from using the rivet configuration shown in Figure 1 because the rivet in Figure 1 does not provide a satisfactory rivet bearing joint.

Additionally, in the above referenced Office Action, it is admitted that Gapp fails to disclose a system using a rivet to join two structures wherein the first structure is a composite material and the second structure is a metallic material. The Office Action relies on Wolnek to correct this deficiency, stating that Wolnek teaches joining a metallic material to a composite material with a rivet. However, Wolnek teaches joining a metallic material to a metallic inlay embedded in a composite. Combining the rivet shown in Figure 1 of Gapp with the structures shown in Wolnek would result in the Figure 1 rivet joining a metallic structure with the metallic inlay of Wolnek. This combination would not teach or suggest a system of joined structures that includes a first structure having a first aperture in a composite material wherein (a) the first aperture has a first interior surface and a first minimum radial extent, (b) the composite material is configured so that a small radial force applied to the first internal surface will damage the composite material, and (c) the first minimum radial extent is at least approximately the same as a second radial extent of a

second aperture in metallic material of a second structure, as recited in claim 29. Accordingly, Gapp and Wolnek do not support a *prima facie* case of obviousness under §103.

Furthermore, even if for the sake of argument Gapp and Wolnek together did disclose all of the elements of claim 29, the combination of Gapp and Wolnek is improper and cannot support an obviousness rejection of claim 29. The MPEP explains the fundamental criteria for an obviousness rejection under §103 as follows:

> To establish a *prima facie* case of obviousness three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. **The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure**.

MPEP § 2142 (emphasis added). Additionally, the MPEP specifically warns that the Examiner must explain why one of ordinary skill in the art would be motivated to alter Gapp in view of Wolnek to arrive at the claimed invention:

> The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. Although a prior art device "may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so."

MPEP § 2143.01, quoting *in re Mills*, 916 F.2d 680 (Fed. Cir. 1990). (Emphasis in original.)

MPEP § 2145 goes on to state that "[i]t is improper to combine references where the references teach away from their combination." (MPEP § 2145 X. D. 2). The MPEP further states that "proceeding contrary to accepted wisdom in the art is evidence of nonobviousness" (MPEP § 2145 X. D. 3). Accordingly, because Gapp teaches away from pending claim 29, a *prima facie* case of obviousness has not been shown. One skilled in the art simply would not be motivated to use a rivet which Gapp specifically teaches does not provide a proper rivet joint to join two structure.

Furthermore, one skilled in the art would not be motivated to join the metallic structure with the inlay imbedded in the composite material in Wolnek using the rivet shown in Figure 1 of Gapp because Wolnek specifically shows a rivet fully expanded into both the metallic structure and the metallic inlay. Gapp teaches that the Figure 1 rivet joint is improper and does not provide maximum strength. Accordingly, one skilled in the art would not be motivated to use the Figure 1 rivet to replace the fully expanded rivet shown in Wolnek because Gapp teaches that doing so would create a weaker joint. Additionally, there is nothing in the combined references to teach or suggest joining a metal structure to a composite structure without the Wolnek inlay such that the resultant structure forms a system of joined structures that includes a first structure having a first aperture in a composite material wherein (a) the first aperture has a first interior surface and a first minimum radial extent, (b) the composite material is configured so that a small radial force applied to the first internal surface will damage the composite material, and (c) the first minimum radial extent is at least approximately the same as a second radial extent of a second aperture in metallic material of a second structure, as recited in claim 29.

Therefore, for at least this additional reason, even if for the sake of argument the combination of Gapp and Wolnek taught all of the elements of claim 29, the combination of these references would be improper. Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness and the rejection of claim 29 should be withdrawn. Claims 31-41 depend from claim 29 and, for at least this reason and for the additional features of these claims, claims 31-41 are also patentable over Gapp and Wolnek.

Independent claims 42, 45, and 47 contain features generally similar to those of claim 29 and, for this reason and for the additional features of these claims, claims 42, 45, and 47 are also patentable over Gapp and Wolnek. Claims 43-44, claim 49, and claims 48 and 50 depend from claims 42, 45, and 47, respectively. For this reason and for the additional features of these claims, claims 43-44, claim 49, and claims 48 and 50 are also patentable over Gapp and Wolnek.

In view of the foregoing, the pending claims comply with 35 U.S.C. § 112 and are patentable over the applied art. The applicant accordingly requests reconsideration of the application and a Notice of Allowance. If the Examiner has any questions or believes a telephone conference would expedite prosecution of this application, the Examiner is encouraged to call the undersigned at (206) 359-6477.

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Respectfully submitted,

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